Draft Regulatory Concepts for In-Use Stationary Diesel Agricultural Engines

Public Workshop

April 26 and 27, 2006

California Environmental Protection Agency

Air Resources Board

Background

- Diesel Risk Reduction Plan October 2000
- Board Adopts Airborne Toxic Control Measure for Stationary Compression Ignition (CI) Engines (ATCM) February 2004
  - Board Directs Staff to Investigate In-Use Agricultural Engine Regulation
  - ATCM Emission Limits for New Agricultural Engines Effective January 2005, Revised September 2005
- San Joaquin and South Coast Districts Adopt Rules June 2005

Applicability

- Applies to Greater Than 50 HP In-Use Stationary Diesel Ag. Engines
- Ag. Wind Machines Exempt
- Ag. Emergency Standby Generator Sets Exempt

Basis for Proposed Amendments Overview of Off-Road CI Engine Standards for ≥175 to 750 HP Engines

	PM g/bhp-hr	NOx g/bhp-hr	Year First Offered
Tier 0 (Non-certified)	0.55-0.77	11-14	Pre-1996
Tier 1	0.40	6.9	1996
Tier 2	0.15	4.6	2000-2003*
Tier 3	0.15	2.7	2006
Tier 4	0.01	1.5	2011

*depends on horsepower size

Proposed Non-certified In-Use Stationary Diesel Ag. Engine PM Emission Limits

Non-certified (Tier 0) Engine HP	Off-Road Engine Cert. Standard	Proposed ATCM Compliance
>50 - 99	Tier 3 or 4 Jan. 1, 2008	Dec. 31, 2011
100 -174	Tier 3 Jan. 1, 2007	Dec. 31, 2010
175 - 750	Tier 3 Jan. 1, 2006	Dec. 31, 2009
>750	Tier 4 Jan. 1, 2011	Dec. 31, 2014

Proposed T1,T2-Certified In-Use Stationary Diesel Ag. Engine PM Emission Limits

Tier 1 or Tier 2 Certified Engine HP	Off-Road Engine Cert. Standard	Proposed ATCM Compliance
>50 - 174	Tier 4 Jan. 1, 2012	Dec. 31, 2015*
≥175	Tier 4 Jan. 1, 2011	Dec. 31, 2014*

* or 12 years after initial installation

Proposed Emission Limits for Other Pollutants

- Emission Limits for Other Pollutants (NOx, NMHC+NOx, HC, and CO)
- Based on Engine Model Year and HP, Required to Meet Off-Road Engine Certification Standard Tier 1-4 Levels

Examples

- 1995 Tier 0 Engine, 200 Horsepower
  - **By December 31, 2009, replace with electric motor, Tier 3 engine, or**
  - **Meet equivalent Tier 3 PM standard and Tier 1 standards for NOx and other pollutants**
- 2005 Tier 2 Engine, 100 Horsepower
  - **By December 31, 2017, replace with electric motor, Tier 4 engine, or**
  - **Meet equivalent Tier 4 PM standard and Tier 2 standards for NOx and other pollutants**
- Engine Replacement Is the Expected Compliance Strategy

Reasons to Expect Engine Replacement as the Compliance Strategy

- Multiple Pollutant Emission Reductions
- Once an Engine Is Replaced with Electric Motor or Tier 3/Tier 4 Engine, Emissions and Potential Cancer Risk Are Largely Addressed
- To Date, No Verified PM Add-on Control Device for Ag. Engines
- Incentive Programs
- Existing San Joaquin Valley and South Coast District NOx Rules Primarily Rely on Engine Replacement

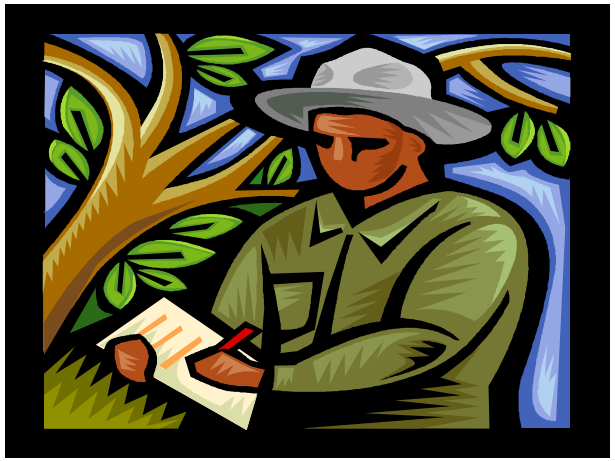
Comparison of ARB and District Compliance Dates

	ARB Draft ATCM Revision	San Joaquin Rule 4702	South Coast Rule 1110.2
Tier 0	~2010-12	~2010-11	2008-10
Tier 1	~2015-16*	2015*	2008-10
Tier 2	~2015-16*	2015*	2008-10

* or 12 years after initial installation

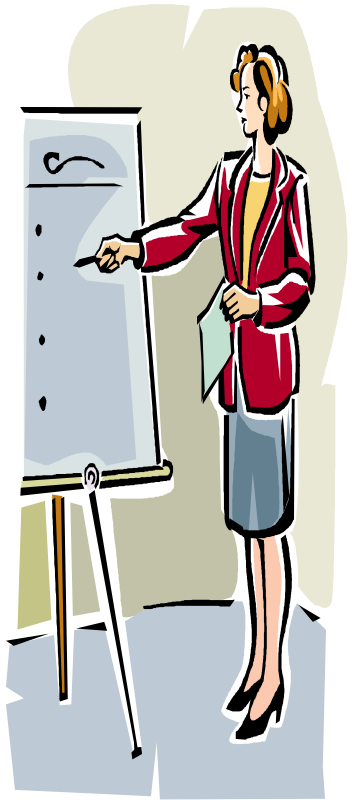
Proposed Reporting Requirements

- ARB Staff Is Seeking Comment on Options for Owner or Operator Reporting Requirements:
  - Notification within 6 months of ATCM revisions
  - Notification 6 months prior to emission limit compliance date
  - District registration program
  - Voluntary initial information submittal



Purpose of Reporting Requirements

- Need Information to:
  - Conduct outreach
  - Target incentive funding
  - Promote equity
- No reporting if district already has information

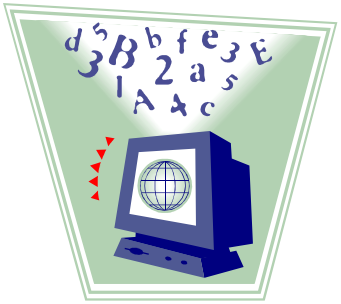


Ongoing Work

- Health Risk Assessment
- Environmental Impact Analysis
- Economic Impact Analysis
- Emission Inventory Update

Further Information

- Webpage: http://www.arb.ca.gov/diesel/ag/inuseag.htm
- List Serve: http://www.arb.ca.gov/listserv/inuseag.htm
- Richard Boyd, Manager, Process Evaluation Section, (916) 322-8285 or rboyd@arb.ca.gov; or
- Barbara Cook, (916) 323-0440 or bcook@arb.ca.gov



Sacramento Webcast Audience Questions and Comments

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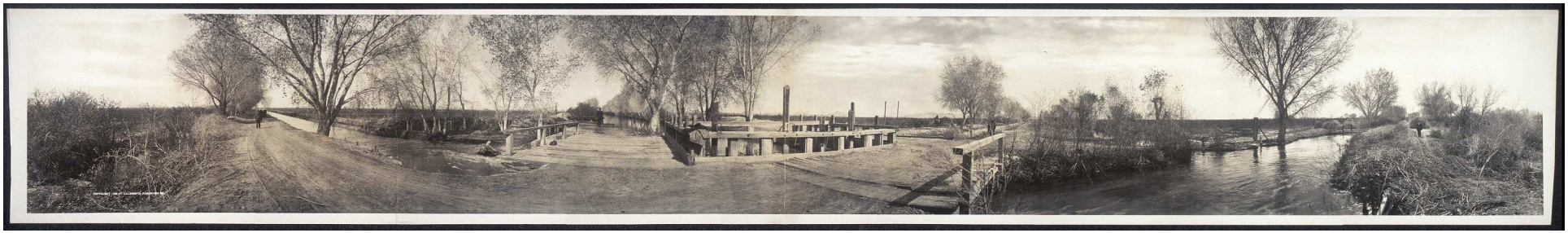
Public Workshop

April 26-27, 2006

Andy Alexis

In-Use Agricultural Pump Engine Emission Inventory



Why Update the Inventory?

- Regulatory development
- New information:
  - Population: 12,535 (USDA,2003) vs. 8,200 (USDA, 1999)
  - Load Factor: 75% vs. 65%
  - Revised Emission Factor Assumptions
  - Revised Horsepower Estimates
- Statewide consistency

Outreach Process

- Agricultural Stakeholders
  - **Ag. Tech Committee, SJUAPCD**
  - **Ag. Industry Representatives**
- Local Air Districts
  - **Technical Committee**
  - **Teleconferences**
- Public Workshops

Types of Irrigation Pumps

- Well pumps
- Non-well pumps:
  - **Tailwater pit discharge**
  - **Pond/lake discharge**
  - **Relift/booster pumps**
- Both can be either stationary or portable
- Both can be used with a variety of irrigation systems

Data Sources

- Population:
  - **USDA Farm and Ranch Irrigation Survey (2003)**
  - **Local Air Districts**
  - **Moyer Program Data**
- Emission Factors:
  - **ARB OFFROAD Model**
- Engine Characteristics:
  - **Manufacturers**

Approach

- Bottom up
  - **Permit/Survey data where appropriate**
  - **Moyer program data**
- Top down
  - **Estimates verified where possible with bottom up data**
  - **Allocate to counties using surrogates**

Calculating Emissions

$$Emissions = Sum(Pop * Act * EF * LF * Hp)$$

- Where:
  - **Pop: Population by equip.type, location & Hp**
  - **Act: Activity, (hours/year)**
  - **EF: Emission Factor, (gms/hp-hr)**
  - **LF: Load Factor (percentage)**
  - **Hp: Horsepower of Equipment**

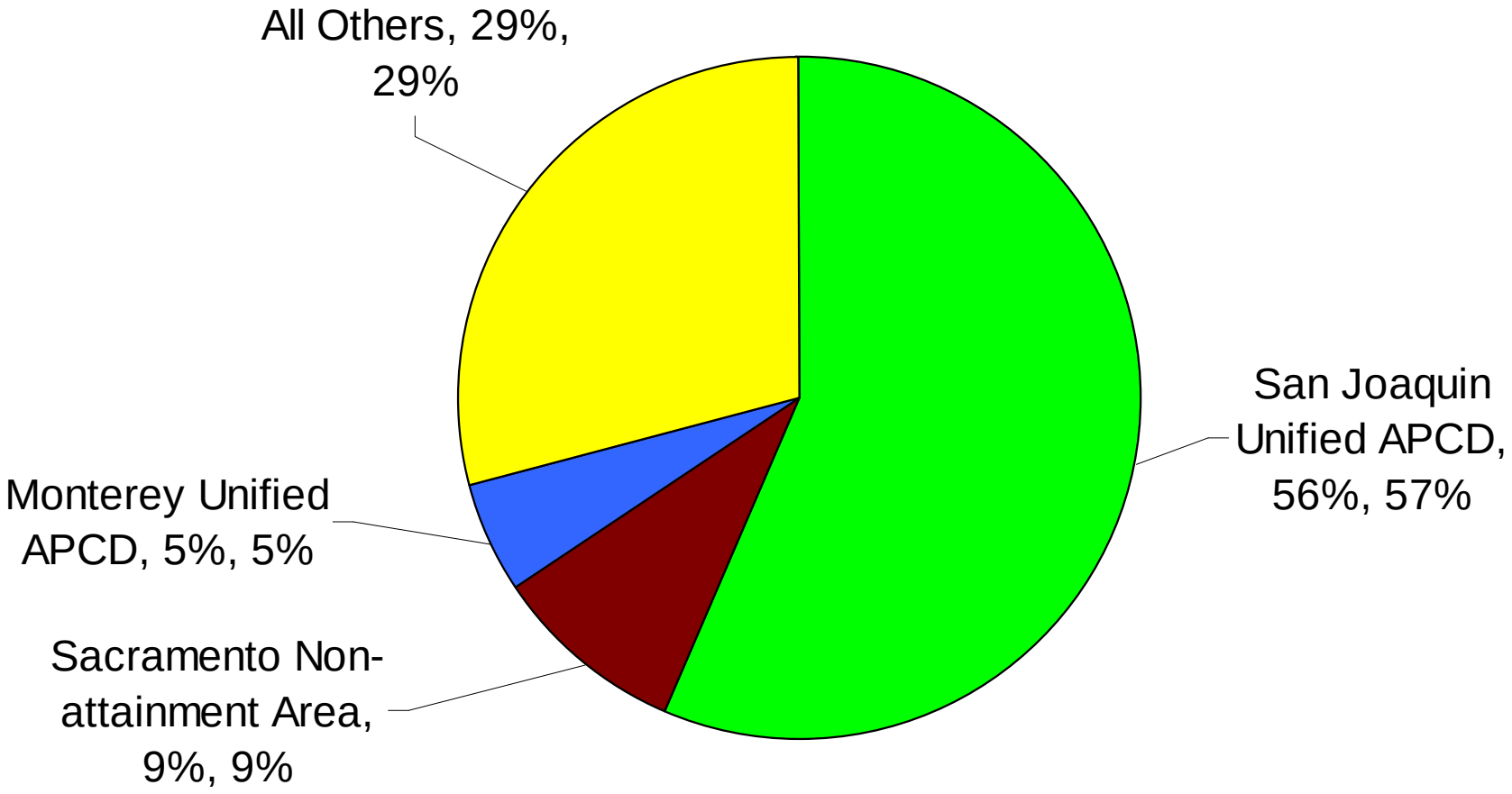
Population

- Statewide:
  - **USDA Farm and Ranch Irrigation Survey, 2003:**
    - **12,535 Diesel (~14%):**
      - **2/3 are well pumps**
- District populations
  - **Subtracted from statewide totals**
- Top-down estimates:
  - **Where are they?**
  - **How big are they?**
  - **Stationary or Portable?**

Population – Where are they?

- Populations estimated by ratios:
  - **Well Pumps:**
    - **Gallons of ground water by county used for irrigation**
  - **Non-Well Pumps:**
    - **Gallons of surface water by county used for irrigation**
    - **Adjusted with an estimate of gravity flow**
- District Data Used:
    - **Sacramento Non-Attainment Area**
    - **South Coast**

Population – Where are they?



Population: Stationary or Portable?

- Definition:
  - **Districts: Varies**
  - **ARB**
- How to Estimate?
  - **OFFROAD Default**
    - **Based on HP: large HP is stationary**
    - **Based on 1992 Booz-Hamilton research**
- Population Estimate:
  - **8,707 Stationary**
  - **3,828 Portable**

Activity

- 1000 hours/year in growing season
  - **STI 1996 Report**
  - **PG&E Ag. Use**
  - **USDA 2003 Data**
  - **ARB MSCD 1999 Data**
- 20 Year average estimated useful life
  - **Moyer program data**
  - **Am. Soc. Of Agricultural Engineers**
  - **Sacramento non-attainment area**

Emission Factors

- ARB OFFROAD Model
- Emissions increase with Age:
  - **Moyer Age Distributions (documented Moyer engines only)**
  - **Remaining Engines:**
    - **Estimated Age Distribution based on Historic Engine Populations**

Load Factor

- 75% Load Factor
- Based on interviews with equipment manufacturers, dealers
- Trade off with horsepower estimate

Horsepower

- Very limited data available
- Horsepower estimated:
  - **Calculate energy required to move water**
  - **Well Pumps:**
    - **Well Depths from USGS**
    - **Flow Rate, Pressure from FRIS**
    - **Efficiency Estimated from Engineering Judgment, Fuel Use**
  - **Non-well Pumps:**
    - **Flow Rates, Pressure from FRIS**
- Low-end estimates – Oversizing to increase utility

Validation of Horsepower Estimates

- Estimates compare well:
  - **SJV Moyer Engines:**
    - **Estimated 195 hp**
    - **Moyer 197 hp**
  - **Sac. Non-attainment Area:**
    - **Estimated 153 hp**
    - **District 146 hp**

Growth

- April, 2005 Ag Advisory Committee
- Agricultural Growth Rates
  - **Irrigated Acres**
    - **By District**
  - **Negative except for Madera and Merced Co.**
  - **Avg. Statewide -2.6% per year**

Draft Emissions Estimates

Engine Parameters		
Parameter	**Old**	**New**
Population	8,212	12,535
Load Factor	65%	75%
Activity	1,000 hours	1,000 hours

Draft Emissions Estimates

Emissions – Tons/day		
Pollutant	**Old**	**New**
NO_x	30.3	51
PM_{10}	2.2	3.4
ROG	3.2	4.5

What is Next?

- May-June 2006:
  - **Complete documentation and inventory**
  - **Management Review**
  - **Workshops**
  - **Meet with district and agriculture workgroups**
  - **Adjust inventory based on comments**
- August-September 2006:
  - **Regulatory Documents Available**
- October 2006:
  - **Board Hearing**

Contact Information

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Project Web Page:
http://www.arb.ca.gov/diesel/ag/inuseag.htm

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Other Proposed Revisions to the ATCM for Stationary CI Engines

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Other Proposed Revisions to the ATCM for Stationary CI Engines

- A number of concerns have been raised since the September 2005 Amendments to the ATCM
  - **Staff will be proposing potential amendments to address those concerns**

Potential Amendments

Issue: Fueling practices make it difficult to provide certain purchase records or fuel compositions for compliance to the ATCM.

- Potential amendment
  - **Streamline the fuel reporting requirements for emergency standby CI engines by allowing the owner or operator to retain sufficient purchase records to demonstrate compliance with the fuel requirements of the ATCM.**

Potential Amendments

Issue: Facilities are uncertain how to account for the additional hours of operation resulting from testing engines that have experienced equipment breakdown or failure during scheduled or routine maintenance.

- Potential Amendment
  - **Amend the definition of maintenance and testing to consider these additional hours of operation as emergency use and not counted as maintenance and testing hours.**

Potential Amendments

Issue: The definition of CARB diesel fuel requires conformance with ASTM D975, which is not required under the CARB diesel fuel regulations

- Potential Amendment
  - **Harmonize the definition of CARB diesel in the ATCM with CARB diesel fuel regulations. This would allow biodiesel blends to be considered CARB diesel as long as the resulting fuel blends meet the sulfur, aromatics, and lubricity requirements of the regulations.**

Potential Amendments

Issue: Distributors and dealers can be left with sizeable non-compliant, non-saleable engine inventory when new, more stringent emission standards become effective.

- Potential amendment
  - **Add a "sell-through" provision that allows distributors and dealers to sell a limited number of CI engines in their inventory as in-use engines. Sufficient documentation must be provided to the districts to evaluate and grant this exemption.**

Potential Amendments

- Issue: The PUC may make tariff changes to the schedule Rolling Blackout Reduction Program (RBRP) implemented by San Diego Gas and Electric in San Diego County.
- Potential amendment
  - **Amend the definition to reference the most recently in effect PUC rate schedule to ensure, as these rates do change, the most current rates and special conditions are in effect.**

Other Potential Amendments

- List of issues or concerns with implementing the ATCM
  - **Test engines at R&D facilities**
  - **Need to keep uninterruptible power system (UPS) equipment offline for testing and repair**
    - **Emergency standby engines needed to run**
  - **Non-substantive corrections**

Next Steps

- ARB is seeking comments and will continue to work with its stakeholders to determine the appropriate revisions.
- Second public workshop is tentatively scheduled in May or June 2006
- Staff report (Initial Statement of Reasons)
  - **August-September 2006**
- Proposed amendments to the Board
  - **October 2006**

Additional Information

- Contacts to discuss issues and/or suggest changes to the ATCM
  - **Erik White, Manager, Technical Analysis Section**
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  - **Ron Hand, staff lead**
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